Architecture Study Team (AST) Overview

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Architecture Study Team (AST)

- Membership includes technical experts from NASA Field Centers, USGS Earth Resources Observation and Science Center, Jet Propulsion Laboratory, Johns Hopkins Applied Physics Laboratory, and The Aerospace Corporation
- Kick-off meeting conducted in September to inform members of the objectives of the study and operational aspects of the AST
- After a two week delay in the start due to the Federal Government shutdown AST assignments were made for individual team members
- Meetings/telecons began in late October
- AST held first two-day face-to-face working session on November 13-14 at GSFC to review RFI responses, establish initial trade space, and solidify plans for study period

AST Focus Group Organization

- Exploration of the Land Imaging trade space has been divided into the following focus group areas, with each major area led by members of the AST
  - Requirements development and prioritization
    - User needs & societal benefit assessment
    - Imaging requirements development
    - Architecture metric development
  - Instrument and observatory design metrics
    - Performance assessment of proposed instrument concepts
    - Advanced enabling technology assessment
    - Spacecraft design drivers and metrics
    - Mass/volume metrics vs. launch options assessment
  - Architecture technical concepts
    - Orbits vs. fields of view vs. revisit vs. number of s/c trades
    - Communications and ground system/processing impacts
    - Mission Operations
  - Business models
    - Procurement methods
    - Commercialization
    - Block buys
    - Hosted payloads
    - International partnerships
  - Architecture gap analysis
  - Cost assessment

AST Study Approach

- Establish study trade space via expert knowledge, intensive AST discussions, and RFI responses
  - Salient features are farmed from the RFI responses and captured according to trade space focus areas
- Explore the Trade space via several design cycles
  - Identify candidate architectures by assessing the ability of available approaches to satisfy desired performance
    - Look for “sweet spots” in the trade space in the attempt to maximize requirements compliance within program cost
  - Develop satellite and system technical parameters and business models for each candidate architecture
  - Perform a lifecycle cost analysis
  - Perform a statistical gap analysis to explore the architecture’s robustness and failure tolerance
  - Assess results, modify architecture as needed, and repeat cycle
- Trade space is narrowed and adjusted through each design cycle
- Appealing architectures that are likely to satisfy budget constraints are further refined and assessed

Land Imaging RFI Responses

Observations

- 35 responses were received
- There were many thoughtful responses on how to address the challenge in part and overall
- Responses came from hardware (s/c, instrument, and LV) and software (data and image processing) developers

How will we use the responses?

- Responses seed the AST thought processes, with key ideas captured by the various subgroups as part of trade space development
- There is no guarantee that they will be used in part or in whole

RFI Response Summary

- RFI responses were wide ranging in nature, from components, to business models, to whole architecture approaches

Topic Area	Addressed In # Responses
Complete System Architectures	5
Series of Single Satellites	7
Multi-Sat Small-Sat Architectures	16
Hosted Payloads	6
Instrument Concepts	10
Ground Systems & Data Processing	13
International Collaboration	3
Business Models	14
Shared Launch	5
Other (e.g., Robotic Serving, Technologies)	14

Industry Participation

- RFI responses have been valuable to help ensure completeness of the AST trade space
  - The AST may send specific clarification questions to individual RFI responders
- No near-term general discussions with industry or paid studies are planned at this time
- Targeting an industry forum in March 2014 to communicate status and solicit feedback on preliminary study conclusions
  - Refined strategies and opportunities for further industry participation in the Land Imaging study program are expected to be presented at that time

AST Status and Plans

- AST has established a candidate architecture taxonomy
  - Technical concepts
  - Business models
  - Launch options
  - Etc.
- AST is currently fleshing out representative flight system technical parameters and preparing for first “design cycle”
  - First cycle will explore a subset of candidate architectures
- Planning to complete 3 design cycles by March 2014 time frame
  - Each cycle to result in initial time-phased cost profiles, earth coverage statistics, and technical assessment for each architecture explored
- AST report with several recommended architectures due to NASA/ESD in May 2014 to support Agency decision processes and OMB/OSTP report development